



WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2005OH21B

Title: Manipulating residence time in agricultural headwater streams: impacts on nitrogen removal and aquatic communities

Project Type: Research

Focus Categories: Nitrate Contamination, Water Quality, Agriculture

Keywords: headwater streams, nitrate, denitrification, retention time

Start Date: 03/01/2005

End Date: 02/28/2006

Federal Funds: \$16,795

Non-Federal Matching Funds: \$33,665

Congressional District: 15

Principal Investigator:
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Abstract

Surface waters in the Midwestern United States are saturated with nitrogen, which has led to contaminated drinking water sources and threaten the ecological integrity of freshwater and marine systems. The main source of nitrogen pollution in the Midwest is agriculture. Intensive agricultural systems not only apply large amounts of nitrogen fertilizer but they are also designed to be well drained. Because these agricultural fields are well drained any nitrogen that is not assimilated will most likely be washed downstream. This leaves great potential if residence times in agricultural streams can be increased enough to stimulate nitrogen removal processes such as denitrification. We suggest that a series of weirs be installed to capture low to intermediate flows in agricultural headwater streams. By increasing residence time, we will increase nitrogen retention, stimulate denitrification, and minimally impact the biotic communities present. The reference streams in this study will be located directly upstream from the flow manipulated section in each headwater stream. A mass balance will be used to measure nitrogen loads to determine nitrogen retention. Acetylene inhibition method will be used on intact sediment cores to measure denitrification rates and various metrics will be used to characterize aquatic biota. The overall objective of this study is to stimulate nitrogen retention in

agricultural headwater streams by increasing residence times without impairing fish and macroinvertebrates.